Claims

What is claimed is:

1. A tension member for providing lifting force to an car of an elevator system, the tension member being engageable with a rotatable sheave of the elevator system, the tension member having a width w, a thickness t measured in the bending direction, and an engagement surface defined by the width dimension of the tension member, wherein the tension member has an aspect ratio, defined as the ratio of width w relative to thickness t, greater than one.

2. The tension member according to Claim 1, further including a plurality of individual load carrying ropes encased within a common layer of coating, the coating layer separating the individual ropes, wherein the coating layer defines the engagement surface for engaging the sheave.

3. The tension member according to Claim 2, wherein the individual ropes are formed from strands of non-metallic material.

4. The tension member according to Claim 1, wherein the tension member is formed from strands of non-metallic material.

5. The tension member according to Claim 2, wherein the coating layer blocks differential longitudinal motion of the plurality of individual ropes.

6. The tension member according to Claim 5, wherein the coating layer retains each of the ropes to block the occurrence of differential motion.

7. The tension member according to Claim 1, wherein the aspect ratio is greater than or equal to two.

8. The tension member according to Claim 2, wherein the individual ropes are spaced widthwise within the common coating layer.

9. The tension member according to Claim 2, wherein the coating layer defines a single engagement surface for the plurality of individual ropes.

10. The tension member according to Claim 9, wherein the coating layer extends widthwise such that the engagement surface extends about the plurality of individual ropes.

11. The tension member according to Claim 1, wherein the sheave includes an engagement surface, and wherein the engagement surface of the tension member is contoured to complement the engagement surface of the sheave.

12. The tension member according to Claim 2, wherein the engagement surface of the coating layer is shaped by the outer surface of the ropes to enhance the traction between the traction sheave and the traction member.

13. The tension member according to Claim 1, further including a coating layer formed from an elastomer.

14. The tension member according to Claim 2, wherein the coating layer is formed from an elastomer.

15. The tension member according to Claim 2, wherein the maximum rope pressure of the load carrying ropes is approximately defined by the following equation:

$$P_{max} = (2F/Dw)$$

Where F is the maximum tension in the tension member and D is the diameter of the traction sheave.

16. The tension member according to Claim 1, wherein the engagement surface is shaped to guide the tension member during engagement with the sheave.

17. The tension member according to Claim 2, wherein the engagement surface of the coating layer is shaped by the outer surface of the ropes to guide the tension member during engagement with the sheave.

18. The tension member according to Claim 2, wherein the plurality of individual ropes are arranged linearly.

19. The tension member according to Claim 8, wherein the plurality of individual ropes are arranged linearly.

20. The tension member according to Claim 2, wherein the individual ropes are round in cross-section.

21. The tension member according to Claim 2, wherein the individual ropes have an aspect ratio greater than one.

22. The tension member according to Claim 21, wherein the individual ropes are flat in cross-section.

23. A traction drive for an elevator system, the elevator system including a car and a counterweight, the traction drive including a traction sheave driven by a machine and a tension member interconnecting the car and counterweight, the tension member having a width w, a thickness t measured in the bending direction, and an engagement surface defined by the width dimension of the tension member, wherein the tension member has an aspect ratio, defined as the ratio of width w relative to thickness t, of greater than one, the traction sheave including a traction surface configured to receive the engagement surface of the tension member such that the traction between the sheave and tension member moves the car and counterweight.

24. The traction drive according to Claim 23, wherein the tension member further includes a plurality of individual load carrying ropes encased within a common layer of coating, the coating layer separating the individual ropes and defining the engagement surface for the tension member.

25. The traction drive according to Claim 23, wherein the traction surface is contoured to complement the engagement surface of the tension member such that traction between the traction sheave and tension member is enhanced.

26. The traction drive according to Claim 23, wherein the traction surface is contoured to complement the engagement surface of the tension member to guide the tension member during engagement with the traction sheave.

27. The traction drive according to Claim 23, wherein the traction surface includes a diameter D, and wherein the diameter D varies laterally to provide a guidance mechanism during engagement of the tension member and traction sheave.

28. The traction drive according to Claim 23, wherein the traction sheave includes a pair of retaining rims on opposite sides of the traction sheave.

29. The traction drive according to Claim 23, including a plurality of the tension members.

30. The traction drive according to Claim 29, wherein the traction sheave includes a traction surface for each tension member, and further includes one or more dividers that separate the plurality of traction surfaces.

31. The traction drive according to Claim 23, further including a guidance device disposed proximate to the traction sheave, the guidance device engaged with the tension member to position the tension member for engagement with the traction sheave.

32. The traction drive according to Claim 31, wherein the guidance device includes a roller engaged in rolling contact with the tension member.

33. The traction drive according to Claim 23, wherein the traction surface is formed from a non-metallic material.

34. The traction drive according to Claim 28, wherein the tension member is formed from a non-metallic material.

35. The traction drive according to Claim 24, wherein the ropes are formed from non-metallic material.

36. The traction drive according to Claim 24, wherein the coating layer is formed from elastomer.

37. The traction drive according to Claim 23, wherein the tension member further includes a coating layer that defines the engagement surface, and wherein the coating layer is formed from elastomer.

38. The traction drive according to Claim 33, wherein the traction surface is formed from polyurethane.

39. The traction drive according to Claim 23, wherein the maximum rope pressure of the load carrying ropes is approximately defined by the following equation:

$$P_{max} \leq (2F/Dw)$$

Where F is the tension in the tension member and D is the diameter of the traction sheave.

40. The traction drive according to Claim 23, further including a sheave liner disposed about the traction sheave, wherein the sheave liner defines the traction surface.

41. The traction drive according to Claim 23, wherein the traction surface is defined by a coating layer that is bonded to the traction sheave.

42. The traction drive according to Claim 23, wherein the traction sheave is formed from the material defining the traction surface.

43. The traction drive according to Claim 42, wherein the traction sheave is formed from polyurethane.

44. A sheave for an elevator system, the elevator system including one or more tension members, each tension member having a width w, a thickness t measured in the bending direction, and an engagement surface defined by the width dimension of the tension member, wherein the tension member has an aspect ratio, defined as the ratio of width w relative to thickness t, of greater than one the traction sheave including a surface configured to receive the engagement surface of the tension member.

45. The sheave according to Claim 44, wherein the elevator system further includes a car and counterweight interconnected by the tension members, and wherein the surface of the sheave is a traction surface configured to receive the engagement surface such that traction between the sheave and tension member moves the car and counterweight.

46. A sheave according to Claim 45, wherein the traction surface is contoured to complement the engagement surface of the tension member such that traction between the sheave and tension member is enhanced.

47. The sheave according to Claim 44, wherein the traction surface is contoured to complement the engagement surface of the tension member to guide the tension member during engagement with the sheave.

48. The sheave according to Claim 44, wherein the surface includes a diameter D, and wherein the diameter D varies laterally to provide a guidance mechanism during engagement of the tension member and sheave.

49. The sheave according to Claim 44, wherein the traction sheave includes a pair of retaining rims on opposite sides of the sheave.

50. The sheave according to Claim 44, wherein the sheave includes a surface for each tension member, and further includes one or more dividers that separate the plurality of surfaces.

51. The sheave according to Claim 44, further including a guidance device disposed proximate to the surface, the guidance device engageable with the tension member to position the tension member for engagement with the surface.

52. The sheave according to Claim 51, wherein the guidance device includes a roller engageable in rolling contact with the tension member.

53. The sheave according to Claim 44, wherein the surface is formed from a non-metallic material.

54. The sheave according to Claim 53, wherein the surface is formed from polyurethane.

55. The sheave according to Claim 44, further including a sheave liner disposed about the sheave, wherein the sheave liner defines the surface.

56. The sheave according to Claim 44, wherein the surface is formed from a non-metallic coating bonded to the sheave.

57. The sheave according to Claim 44, wherein the sheave is formed from a non-metallic material, and wherein the non-metallic material defines the surface for engaging the engagement surface of the one or more tension members.

58. A liner for a sheave of an elevator system, the elevator system including one or more tension members, each tension member having a width w, a thickness t measured in the bending direction, and an engagement surface defined by the width dimension of the tension member, wherein the tension member has an aspect ratio, defined as the ratio of width w relative to thickness t, of greater than one, the liner disposed in a fixed relationship to the sheave and including a surface configured to receive the engagement surface of the tension member.

59. The liner according to Claim 58, wherein the elevator system further includes a car and counterweight interconnected by the tension members, and wherein the surface of the liner is a traction surface configured to receive the engagement surface such that traction between the liner and tension member moves the car and counterweight.

60. The liner according to Claim 59, wherein the surface is contoured to complement the engagement surface of the tension member such that traction between the liner and tension member is enhanced.

61. The liner according to Claim 58, wherein the surface is contoured to complement the engagement surface of the tension member to guide the tension member during engagement with the liner.

62. The liner according to Claim 58, wherein the surface includes a diameter D, and wherein the diameter D varies laterally to provide a guidance mechanism during engagement of the tension member and liner.

63. The liner according to Claim 58, wherein the liner is formed from a non-metallic material.

64. The liner according to Claim 63, wherein the liner is formed from polyurethane.

65. The liner according to Claim 58, wherein the elevator system includes a plurality of tension members, and wherein the liner extends laterally to accommodate the plurality of tension members.